

LABORATORY REPORT

February 13, 2013

Tim Pool
Aquaterra Environmental Solutions, Inc.
13 Executive Dr., Suite 1
Fairview Heights, IL 62208

RE: Cottonwood Hills Flare Gas Sample / 4733.12

Dear Tim:

Enclosed are the results of the samples submitted to our laboratory on February 8, 2013. For your reference, these analyses have been assigned our service request number P1300527.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

Columbia Analytical Services, Inc. dba ALS Environmental (ALS) is certified by the NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA200007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L11-203; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-12-3; Minnesota Department of Health, NELAP Certificate No. 494864; Washington State Department of Ecology, ELAP Lab ID: C946, State of Utah Department of Health, NELAP Certificate No. CA015272012-2; State of Maine Laboratory Certification Program, Certificate No. 2012039. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental



By Sue Anderson at 4:54 pm, Feb 13, 2013

Sue Anderson
Project Manager

Client: Aquaterra Environmental Solutions, Inc. Service Request No: P1300527
Project: Cottonwood Hills Flare Gas Sample / 4733.12

CASE NARRATIVE

The samples were received intact under chain of custody on February 8, 2013 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Sulfur Analysis

The samples were analyzed for twenty sulfur compounds per ASTM D 5504-08 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. dba ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of Columbia Analytical Services, Inc. dba ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

DETAIL SUMMARY REPORT

Client: Aquaterra Environmental Solutions, Inc.
Project ID: Cottonwood Hills Flare Gas Sample / 4733.12

Service Request: P1300527

Date Received: 2/8/2013
Time Received: 09:40

ASTM D5504-01 - Sulfur Bag

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	
CWH-1	P1300527-001	Air	2/7/2013	14:41	X
CWH-2	P1300527-002	Air	2/7/2013	14:46	X
CWH-3	P1300527-003	Air	2/7/2013	14:51	X



Page _____ of _____

WM01021

Sample Acceptance Check Form

Client: Aquaterra Environmental Solutions, Inc. Work order: P1300527
Project: Cottonwood Hills Flare Gas Sample / 4733.12
Sample(s) received on: 2/8/13 Date opened: 2/8/13 by: MZAMORA

Note: This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

	Yes	No	N/A
1 Were sample containers properly marked with client sample ID?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 Container(s) supplied by ALS ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 Did sample containers arrive in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Were chain-of-custody papers used and filled out?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 Did sample container labels and/or tags agree with custody papers?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Was sample volume received adequate for analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 Are samples within specified holding times?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 Was proper temperature (thermal preservation) of cooler at receipt adhered to?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9 Was a trip blank received?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10 Were custody seals on outside of cooler/Box?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Location of seal(s)? _____ Sealing Lid?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were signature and date included?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were seals intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were custody seals on outside of sample container?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Location of seal(s)? _____ Sealing Lid?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were signature and date included?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were seals intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11 Do containers have appropriate preservation , according to method/SOP or Client specified information?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is there a client indication that the submitted samples are pH preserved?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were VOA vials checked for presence/absence of air bubbles?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12 Tubes: Are the tubes capped and intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Do they contain moisture?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
13 Badges: Are the badges properly capped and intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are dual bed badges separated and individually capped and intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1300527-001.01	1 L Zefon Bag					
P1300527-002.01	1 L Zefon Bag					
P1300527-003.01	1 L Zefon Bag					

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO₂, (pH 5-8); Sulfur (pH>4)

RESULTS OF ANALYSIS

Page 1 of 1

Client: Aquaterra Environmental Solutions, Inc.
Client Sample ID: CWH-1
Client Project ID: Cottonwood Hills Flare Gas Sample / 4733.12

CAS Project ID: P1300527
CAS Sample ID: P1300527-001

Test Code: ASTM D 5504-08
Instrument ID: Agilent 7890A/GC22/SCD
Analyst: Mike Conejo
Sample Type: 1 L Zefon Bag
Test Notes:

Date Collected: 2/7/13
Time Collected: 14:41
Date Received: 2/8/13
Date Analyzed: 2/8/13
Time Analyzed: 12:19
Volume(s) Analyzed: 0.050 ml(s)

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	610,000	140	430,000	100	
463-58-1	Carbonyl Sulfide	3,400	250	1,400	100	
74-93-1	Methyl Mercaptan	13,000	200	6,700	100	
75-08-1	Ethyl Mercaptan	510	250	200	100	
75-18-3	Dimethyl Sulfide	19,000	250	7,500	100	
75-15-0	Carbon Disulfide	1,700	160	550	50	
75-33-2	Isopropyl Mercaptan	5,600	310	1,800	100	
75-66-1	tert-Butyl Mercaptan	1,100	370	300	100	
107-03-9	n-Propyl Mercaptan	ND	310	ND	100	
624-89-5	Ethyl Methyl Sulfide	ND	310	ND	100	
110-02-1	Thiophene	5,500	340	1,600	100	
513-44-0	Isobutyl Mercaptan	ND	370	ND	100	
352-93-2	Diethyl Sulfide	ND	370	ND	100	
109-79-5	n-Butyl Mercaptan	ND	370	ND	100	
624-92-0	Dimethyl Disulfide	ND	190	ND	50	
616-44-4	3-Methylthiophene	ND	400	ND	100	
110-01-0	Tetrahydrothiophene	ND	360	ND	100	
638-02-8	2,5-Dimethylthiophene	ND	460	ND	100	
872-55-9	2-Ethylthiophene	ND	460	ND	100	
110-81-6	Diethyl Disulfide	ND	250	ND	50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

RESULTS OF ANALYSIS

Page 1 of 1

Client: Aquaterra Environmental Solutions, Inc.
Client Sample ID: CWH-2
Client Project ID: Cottonwood Hills Flare Gas Sample / 4733.12

CAS Project ID: P1300527
CAS Sample ID: P1300527-002

Test Code: ASTM D 5504-08
Instrument ID: Agilent 7890A/GC22/SCD
Analyst: Mike Conejo
Sample Type: 1 L Zefon Bag
Test Notes:

Date Collected: 2/7/13
Time Collected: 14:46
Date Received: 2/8/13
Date Analyzed: 2/8/13
Time Analyzed: 12:35
Volume(s) Analyzed: 0.050 ml(s)

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	600,000	140	430,000	100	
463-58-1	Carbonyl Sulfide	3,300	250	1,400	100	
74-93-1	Methyl Mercaptan	14,000	200	6,900	100	
75-08-1	Ethyl Mercaptan	530	250	210	100	
75-18-3	Dimethyl Sulfide	19,000	250	7,500	100	
75-15-0	Carbon Disulfide	1,600	160	530	50	
75-33-2	Isopropyl Mercaptan	5,200	310	1,700	100	
75-66-1	tert-Butyl Mercaptan	1,100	370	290	100	
107-03-9	n-Propyl Mercaptan	ND	310	ND	100	
624-89-5	Ethyl Methyl Sulfide	ND	310	ND	100	
110-02-1	Thiophene	6,300	340	1,800	100	
513-44-0	Isobutyl Mercaptan	ND	370	ND	100	
352-93-2	Diethyl Sulfide	ND	370	ND	100	
109-79-5	n-Butyl Mercaptan	ND	370	ND	100	
624-92-0	Dimethyl Disulfide	ND	190	ND	50	
616-44-4	3-Methylthiophene	ND	400	ND	100	
110-01-0	Tetrahydrothiophene	ND	360	ND	100	
638-02-8	2,5-Dimethylthiophene	ND	460	ND	100	
872-55-9	2-Ethylthiophene	ND	460	ND	100	
110-81-6	Diethyl Disulfide	ND	250	ND	50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

RESULTS OF ANALYSIS

Page 1 of 1

Client: Aquaterra Environmental Solutions, Inc.
Client Sample ID: CWH-3
Client Project ID: Cottonwood Hills Flare Gas Sample / 4733.12

CAS Project ID: P1300527
CAS Sample ID: P1300527-003

Test Code: ASTM D 5504-08
Instrument ID: Agilent 7890A/GC22/SCD
Analyst: Mike Conejo
Sample Type: 1 L Zefon Bag
Test Notes:

Date Collected: 2/7/13
Time Collected: 14:51
Date Received: 2/8/13
Date Analyzed: 2/8/13
Time Analyzed: 13:08
Volume(s) Analyzed: 0.050 ml(s)

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	610,000	140	440,000	100	
463-58-1	Carbonyl Sulfide	3,300	250	1,300	100	
74-93-1	Methyl Mercaptan	13,000	200	6,700	100	
75-08-1	Ethyl Mercaptan	480	250	190	100	
75-18-3	Dimethyl Sulfide	19,000	250	7,300	100	
75-15-0	Carbon Disulfide	1,700	160	530	50	
75-33-2	Isopropyl Mercaptan	5,200	310	1,700	100	
75-66-1	tert-Butyl Mercaptan	1,200	370	320	100	
107-03-9	n-Propyl Mercaptan	ND	310	ND	100	
624-89-5	Ethyl Methyl Sulfide	ND	310	ND	100	
110-02-1	Thiophene	6,100	340	1,800	100	
513-44-0	Isobutyl Mercaptan	ND	370	ND	100	
352-93-2	Diethyl Sulfide	ND	370	ND	100	
109-79-5	n-Butyl Mercaptan	ND	370	ND	100	
624-92-0	Dimethyl Disulfide	210	190	53	50	
616-44-4	3-Methylthiophene	ND	400	ND	100	
110-01-0	Tetrahydrothiophene	ND	360	ND	100	
638-02-8	2,5-Dimethylthiophene	ND	460	ND	100	
872-55-9	2-Ethylthiophene	ND	460	ND	100	
110-81-6	Diethyl Disulfide	ND	250	ND	50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

RESULTS OF ANALYSIS

Page 1 of 1

Client: Aquaterra Environmental Solutions, Inc.
Client Sample ID: Method Blank
Client Project ID: Cottonwood Hills Flare Gas Sample / 4733.12

CAS Project ID: P1300527
CAS Sample ID: P130208-MB

Test Code: ASTM D 5504-08
Instrument ID: Agilent 7890A/GC22/SCD
Analyst: Mike Conejo
Sample Type: 1 L Zefon Bag
Test Notes:

Date Collected: NA
Time Collected: NA
Date Received: NA
Date Analyzed: 2/08/13
Time Analyzed: 08:05
Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Result $\mu\text{g}/\text{m}^3$	MRL $\mu\text{g}/\text{m}^3$	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	7.0	ND	5.0	
463-58-1	Carbonyl Sulfide	ND	12	ND	5.0	
74-93-1	Methyl Mercaptan	ND	9.8	ND	5.0	
75-08-1	Ethyl Mercaptan	ND	13	ND	5.0	
75-18-3	Dimethyl Sulfide	ND	13	ND	5.0	
75-15-0	Carbon Disulfide	ND	7.8	ND	2.5	
75-33-2	Isopropyl Mercaptan	ND	16	ND	5.0	
75-66-1	tert-Butyl Mercaptan	ND	18	ND	5.0	
107-03-9	n-Propyl Mercaptan	ND	16	ND	5.0	
624-89-5	Ethyl Methyl Sulfide	ND	16	ND	5.0	
110-02-1	Thiophene	ND	17	ND	5.0	
513-44-0	Isobutyl Mercaptan	ND	18	ND	5.0	
352-93-2	Diethyl Sulfide	ND	18	ND	5.0	
109-79-5	n-Butyl Mercaptan	ND	18	ND	5.0	
624-92-0	Dimethyl Disulfide	ND	9.6	ND	2.5	
616-44-4	3-Methylthiophene	ND	20	ND	5.0	
110-01-0	Tetrahydrothiophene	ND	18	ND	5.0	
638-02-8	2,5-Dimethylthiophene	ND	23	ND	5.0	
872-55-9	2-Ethylthiophene	ND	23	ND	5.0	
110-81-6	Diethyl Disulfide	ND	12	ND	2.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: Aquaterra Environmental Solutions, Inc.
Client Sample ID: Lab Control Sample
Client Project ID: Cottonwood Hills Flare Gas Sample / 4733.12

CAS Project ID: P1300527
 CAS Sample ID: P130208-LCS

Test Code: ASTM D 5504-08
 Instrument ID: Agilent 7890A/GC22/SCD
 Analyst: Mike Conejo
 Sample Type: 1 L Zefon Bag
 Test Notes:

Date Collected: NA
 Date Received: NA
 Date Analyzed: 2/08/13
 Volume(s) Analyzed: NA ml(s)

CAS #	Compound	Spike Amount ppbV	Result ppbV	% Recovery	CAS	Data Qualifier
					Acceptance Limits	
7783-06-4	Hydrogen Sulfide	2,050	1,560	76	63-140	
463-58-1	Carbonyl Sulfide	2,020	1,400	69	63-138	
74-93-1	Methyl Mercaptan	1,890	1,370	72	63-144	